WDNR Lake Superior Creel Survey Report 2019

Chris Zunker

Lake Superior Fisheries Management Team

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Introduction

The WDNR Lake Superior Fisheries Management Team conducts an annual creel survey of the open-water and ice fishing seasons in Wisconsin waters of Lake Superior spanning all the way from Superior Entry to Saxon Harbor. In addition, mandatory monthly harvest reports are gathered from all licensed charter captains in Wisconsin waters of Lake Superior. This creel survey is a major undertaking for the Lake Superior Fisheries Management Team in terms of time and money; approximately 5,000 seasonal employee hours (i.e., creel clerks) and hundreds of hours of permanent staff (e.g., processing data, reports, etc.) are required each year to effectively run the creel survey.

The harvest estimates resulting from this creel survey are crucial for numerous reasons. First, Lake Trout harvest estimates from management unit WI-2 are monitored closely to ensure the sport harvest does not exceed the quota allotted to sport fishers (2/3 of the total State allotment) as put forth by the 2018-2028 Lake Superior Fishing Agreement. Second, Lake Trout sport harvest, fishing effort, and size distribution of harvested Lake Trout are important inputs into the statistical catch-at-age model used to set the Lake Trout total allowable catch in WI-2. Third, harvest estimates of all species from the creel survey are used to evaluate effects of fishing regulation changes on sport fishing harvest. Lastly, harvest results are continually used to monitor "return-to-creel" rates of stocked fish and assess sport fishing preferences and popularity of various fisheries.

Methods

The sport fishery harvest in Wisconsin waters of Lake Superior was estimated during the 2019 lake trout sport fishing season (December 1, 2018 through September 30, 2019). Fishing effort, harvest and harvest rates were determined from 1) a stratified-random creel survey during the ice fishing season (WI-2 only) and the open-water fishing season and 2) mandatory licensed charter boat reporting.

In summary, the creel survey works by estimating total fishing effort (hours) through a series of random vehicle/trailer counts at public access locations and then extrapolating those effort values to the total number of fishing days. Creel clerks interview anglers which provides information such as number of anglers in the party, time spent fishing, relative location fished, fish species targeted, number of fish harvested, and biological characteristics (e.g., length, fin clips, etc.) of harvested fish. From this information, anglers are separated into various "fisheries" (see more details of different fisheries below) in order to appropriately allocate the estimated effort to different fisheries. Harvest rates (number of fish per angler-hour) are also calculated from interview information; harvest rates and total effort are calculated for each fishery by day type (i.e., weekend/weekday) for each location (e.g., Ashland route) within each month. Harvest estimates are calculated by multiplying the harvest rate by the total effort (angler-hours) within each of these groupings.

Harvested fish were identified and measured to the nearest tenth of an inch. Fin clips as well as any tags that were present were recorded. The Wisconsin waters of Lake Superior are divided into two management units: WI-1 or the Western Arm (west of the line running north-south from Bark Point; 46 deg. 53.21 min. N, 91 deg. 11.16 min. W) and WI-2 or the Apostle Islands region (east of the Bark Point line; Figure 1). Creel results were therefore separated by management unit.

Interview and count (effort) data were entered into a Microsoft Access database and subsequently run through a program in the statistical program R (R version 3.6.1) to obtain harvest and effort estimates. Original functions to calculate creel statistics and randomize creel schedules were developed by Dr. Derek Ogle of Northland College.

December Open-Water Survey

An open-water creel survey was conducted along the main shore from December 1, 2018 – December 29, 2018 (final ice up) at access points near Ashland, Washburn, Bodin's Resort, Sioux River Access, Bayfield, Red Cliff and Little Sand Bay. Trailer and angler counts along with interviews were obtained using a stratified creel survey method. Interviews were conducted in the same manner as the open-water private method (below).

Ice Creel Survey

An ice creel survey was conducted near Ashland (i.e., Second Landing-Long Bridge) from December 1, 2018 to April 6, 2019 and near Washburn/Bayfield ("S" Curve-Bono Creek access through the northern most area of fishing activity Bayfield / Red Cliff) from December 30, 2018 – April 14, 2019. Trailer and angler counts were obtained using the stratified creel survey method. Two separate vehicle counts were made daily starting at approximately 9:00 AM and 2:00 PM for each site in each random route. Vehicles present in morning and afternoon checks were not counted twice. Interviews for the ice creel survey were obtained using a targeted method and were conducted at the site. Any number of anglers in a vehicle was considered an angling party. Anglers interviewed in the ice fishery were separated into three different fisheries: Ice Shallow Water (less than 60 feet), Ice Deep Water- "Bobbing" (greater than or equal to 60 feet) and Northern Pike Ice Spearing.

Open-Water Private Survey

In 2019, a single-loop time interval creel survey was conducted during the open-water fishing season on Wisconsin waters of Lake Superior. The following locations were surveyed (start date): Ashland (May 18), Bayfield (April 20), Cornucopia / Port Wing (April 21), Little Sand Bay (April 20), Red Cliff (April 26), Saxon (Aug. 31), Superior (May 6) and Washburn (May 18). The open water survey ended on September 30.

Trailer and angler counts along with interviews were obtained using a stratified creel survey method. Using the time interval procedure, vehicles with boat trailers and harbor boats were counted at each access site. Boats going out to fish or returning from fishing were counted as a fraction of the time the clerk spent at the site (i.e., individual boat count = [creel shift in minutes – minutes at site] / creel shift in minutes). A boat beginning to fish was added to the initial count, and a boat stopping or returning from fishing was subtracted from the initial count.

Boats returning from fishing were interviewed at the site. Total number of anglers on board was treated as an angler party, and parties were categorized by fishery. For example, if the boat was fishing for cool-water species such as northern pike, walleye, yellow perch, or smallmouth bass in a predominately cool-water area, it was recorded as "Open-Water Cool". If the boat was fishing for trout, salmon or lake whitefish (i.e., cold-water species), it was recorded in "Open-Water Cold". If the boat was fishing for "anything that bites", the area the boat fished would determine which category to place the boat. Finally, if the party was not fishing, it was placed in the category "Pleasure", and therefore, that effort was not applied to harvest estimates. Charter boats were not counted in effort estimates at a site due to mandatory reporting (see below). Sailboats were also excluded from counts unless fishing gear (e.g., downriggers or rods) was present. The jurisdiction in which the boat fished was also determined. Saxon Harbor and Superior are considered boundary waters with Michigan and Minnesota, respectively. Effort and harvest of parties fishing in non-Wisconsin waters were not included in Wisconsin harvest estimates. Boats that fished both states' waters had half the total effort/harvest assigned to Wisconsin waters.

Charter Reporting

Harvest estimates for guided charters came from mandatory monthly reports that were initiated in 1973. Information on number of anglers, hours fished, location (grid), and number of various species harvested was included in the Sport Trolling License Monthly Report (Form 9400-249).

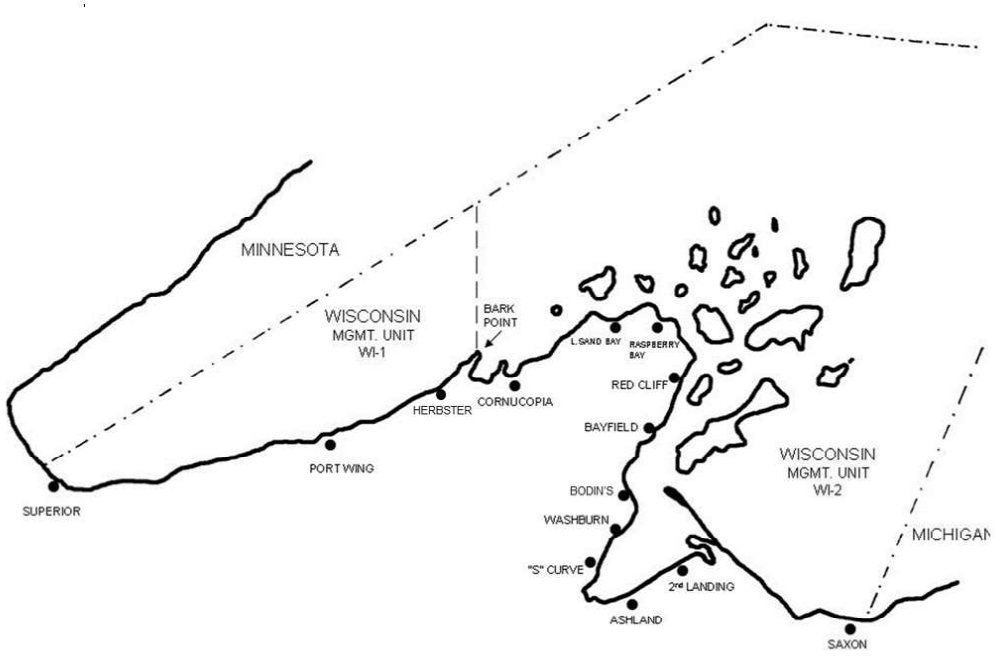

Figure 1. Wisconsin waters of Lake Superior, management units WI-1 and WI-2, and major ports in the WDNR Creel Survey.

Results

WI–1

The 2019 Creel Survey included 957 interviews of angler parties and 1,861 measured fish in management unit WI-1. Anglers spent an estimated 63,554 hours fishing in management unit WI-1 during 2019 (Figure 2). This effort was higher than the previous two seasons. The estimated harvest of from all three fisheries in this management unit was 12,656 fish (Figure 3). Walleye (4,524), lake trout (4,102) and Coho salmon (2,252) accounted for 86% of the harvest. Overall harvest rate was 0.1991 fish/hour; walleye was the highest with 0.0712 fish/hour, followed by lake trout (0.0645 fish/hour) and Coho salmon (0.0354 fish/hour; Figure 4).

Open-Water Cold

The Open-Water Cold fishery had the highest effort in WI-1 with 37,739 angler-hours or 59.4% of the total hours. The Open-Water Cold fishery harvested 6,904 total fish; lake trout (3,319) and Coho salmon (2,016) accounted for 77.3% of the harvest in this fishery. Overall harvest rate was 0.1829 fish/hour; lake trout was highest with 0.0880 fish/hour followed by Coho salmon (0.0534 fish/hour).

Open-Water Cool

The Open-Water Cool fishery accounted for 22,753 hours or 35.8% of the total angler-hours in WI-1. The Open-Water Cool fishery harvested 4,768 fish. Walleye dominated this fishery with a harvest of 3,998 fish or 83.9% of the harvest. Overall harvest rate was 0.2096 fish/hour. Walleye harvest rate was 0.1757 fish/hour.

Charter

The Charter fishery accounted for 3,062 hours or 4.8% of the total angler-hours in WI-1. The Charter fishery harvested 984 fish; lake trout (581), Coho salmon (177) and walleye (108) accounted for 88% of the harvest. Overall harvest-rate was 0.3214 fish/hour; lake trout was highest with 0.1898 fish/hour, followed by Coho salmon (0.0578 fish/hour) and walleye (0.0353 fish/hour).

WI–2

The 2019 Creel Survey included 2,388 interviews of angler parties and 4,725 measured fish in management unit WI-2. Anglers spent an estimated 195,536 hours fishing in WI-2 during 2019 (Figure 2). This effort was slightly lower than the previous two seasons. The estimated harvest was 51,908 fish (Figure 3). Yellow perch (12,148), lake trout (10,819), lake whitefish (9,917), Coho salmon (7,276) and brown trout (4,506) were the top five species harvested and accounted for 86% of the total harvest. Overall harvest rate was 0.2655 fish/hour (Figure 4). Yellow perch had the highest harvest rate with 0.0621 fish/hour, followed by lake trout (0.0553 fish/hour), lake whitefish (0.0507 fish/hour), Coho salmon (0.0372 fish/hour), and brown trout (0.0230 fish/hour). Of the 4,506 brown trout harvested in WI-2, approximately 61.8% were hatchery-origin (stocked).

December Open-Water

The December Open-Water fishery accounted for 1,008 hours for 0.5% of the total angler-hours in WI-2. This fishery harvested 437 fish, and brown trout harvest was the highest with 254 fish or 58.1% of the total harvest, followed by Coho salmon (72) and splake (63). Overall harvest rate was 0.4332 fish/hour, the highest overall harvest rate of any fishery in this survey.

Ice Shallow Water < 60’

The Ice Shallow Water < 60’ fishery accounted for 68,544 hours or 35.1% of the total angler-hours fished in WI-2. The effort in 2019 was lower than 2018 (91,145 hours) but higher than 2017 (55,415 hours). This fishery harvested 21,589 fish or 41.6% of the harvest in this management unit. Yellow perch (10,740), lake whitefish (3,292), rainbow smelt (2,012), splake (1,664), brown trout (1,359) and Coho salmon (1,044) were the top six species harvested and accounted for 93.2% of the total harvest in this fishery. Overall harvest rate was 0.3150 fish/hour. Yellow perch harvest rate was highest with 0.1567 fish/hour, followed by lake whitefish (0.0480 fish/hour), rainbow smelt (0.0294 fish/hour), splake (0.0243 fish/hour), brown trout (0.0198 fish/hour), and Coho salmon (0.0152 fish/hour).

Ice Deep Water ≥ 60’

The Ice Deep Water ≥ 60’ fishery accounted for 11,215 hours or 5.7% of the total angler-hours fished in WI-2. The effort in 2019 was lower than 2018 (22,412 hours) but higher than during 2017 (3,728 hours). This fishery harvested 3,199 fish, or 6.2% of the total harvest in this management unit. Lake whitefish (1,865) and lake trout (1,188) accounted for 95.4% of this fishery. Overall harvest rate was 0.2853 fish/hour. Lake whitefish was highest with 0.1663 fish/hour followed by lake trout at 0.1059 fish/hour.

Open-Water Cold

The Open-Water Cold fishery accounted for 80,160 hours or 41% of the total angler-hours in WI-2. This fishery harvested 20,398 fish or 39.3% of the total harvest in this management unit. Lake trout (7,263), Coho salmon (5,245), lake whitefish (3,977), and brown trout (2,485) were the top four species harvested and accounted for 93% of the harvest in this fishery. Overall harvest rate was 0.2545 fish/hour. Lake trout was the highest with 0.0906 fish/hour, followed by Coho salmon (0.0654 fish/hour), lake whitefish (0.0496 fish/hour), and brown trout (0.0310 fish/hour).

Open Water Cool

The Open-Water Cool fishery accounted for 26,597 hours or 13.6% of the total angler-hours in WI-2. This fishery harvested 2,854 fish or 5.5% of the total harvest in this management unit. Yellow perch (1,298), lake whitefish (749), and walleye (661) accounted for 94.9% of the harvest in this fishery. Overall harvest rate was 0.1073 fish/hour. Yellow perch was the highest with 0.0488 fish / hour, followed by lake whitefish 0.0282 fish/hour and walleye 0.0249 fish/hour.

Charter

The Charter fishery accounted for 8,012 hours or 4.1% of the total angler-hours in this management unit. This fishery harvested 3,431 fish or 6.6% of the total harvest in this management unit. Lake trout (1,966), Coho salmon (899), and brown trout (381) accounted for 94.6% of the harvest in this fishery. Overall harvest rate was 0.4283 fish/hour. Lake trout had the highest harvest rate with 0.2454 fish/hour followed by Coho salmon 0.1122 fish/hour.

LAKE TROUT FISHERY

WI-1

Daily bag limit: 3, minimum length limt: 15 in., only one > 25 in.

The estimated lake trout harvest by sport anglers fishing in management unit WI–1 was 4,102 fish (Figure 5). This was higher than the previous two seasons (2018, N = 2,916; 2017, N = 2,957) but near the average harvest since 2006 (Figure 7). Of the 4,102 lake trout harvested in WI–1, the Open-Water Cold fishery represeneted the highest harvest (3,319), followed by the Charter (581) and the Open-Water Cool fisheries (202). Approximately 15.9% of the harvested lake trout in WI-1 were hatchery-origin (stocked).

The overall lake trout harvest rate was 0.0645 LT/hour (Figure 6). This was similar to the previous two seasons (2018, 0.0649 LT/hour; 2017, 0.0638 LT/hour. The Charter fishery had the highest lake trout harvest rate with 0.1898 LT/hour. This was lower than the previous two seasons (2018, 0.3006 LT/hour; 2017, 0.1999 LT/hour). The Open-Water Cold fishery had a lake trout harvest rate of 0.0880 LT/hour. This was higher than last season's rate of 0.0764 LT/hour but lower than 2017 (0.1035 LT/hour). The 2019 Open-Water Cold lake trout harvest rate was near the average harvest rate since 2006 in WI-1 (Figure 7).

WI-2

Daily bag limit: 2, minimum length limt: 15 in., only one > 25 in.

The estimated lake trout harvest by sport anglers fishing in management unit WI–2 was 10,819 fish (Figure 5). This was higher than the 2017 harvest (10,387), but lower than the 2018 harvest (13,446) and slightly below the long-term average (Figure 7). Of the 10,819 lake trout harvested in WI–2, the Open-Water Cold fishery harvested the most lake trout (7,263), followed by the Charter (1,966), Ice > 60' (1,188), Ice < 60' (395), and the December Open-Water fisheries (7). Approximately 1.7% of the harvested lake trout in WI-2 were hatchery-origin (stocked).

The overall lake trout harvest rate was 0.0553 LT/hour. This was similar to last season's rate of 0.0562 LT / hour, and higher than 2017 (0.0506 LT/hour). The Charter fishery had the highest lake trout harvest rate of all fisheries in WI–2 (0.2454 LT/hour). This was down from last season's rate of 0.2768 LT/hour but higher than 2017 (0.2353 LT/hour). The Ice Deep Water $\geq$ 60' fishery was the next highest in lake trout harvest with 0.1059 LT/hour. This was higher than the last two seasons (2018, 0.0853 LT/hour; 2017, 0.0466 LT/hour). The Open-Water Cold fishery had the third highest lake trout harvest rate of 0.0906 LT/hour. This was lower than the previous two seasons (2018, 0.1251 LT / hour; 2017, 0.0930 LT/hour) and slightly lower than the average harvest rate since 2006 (Figure 7).

Acknowledgements

I thank the creel clerks. They work hard at obtaining accurate data for the survey, and they also play an important role by having positive interactions with the public. Their effort is greatly appreciated. The creel clerks involved for this report were: Mark Hanson (Open-Water: Bayfield, Little Sand Bay, Red Cliff; Cornucopia, Port Wing. Winter Creel: Washburn-Red Cliff), Nick Lawson (Open-Water: Ashland, Washburn), Dean Kolpin (Open-Water: Saxon), Dan Wisniewski (Open-Water: Superior) and Thomas Krogmann (Winter Creel: Ashland). I would also like to thank Dr. Derek Ogle of Northland College, who developed the functions to calculate creel statistics and randomize creel schedules in the statistical program R. I would also like to thank Dray Carl for his help with the statistical program R and for reviewing/editing this report.

Note: For more detailed breakdowns of the WDNR Lake Superior Creel Survey results, please find the Supplemental Creel Statistics document.

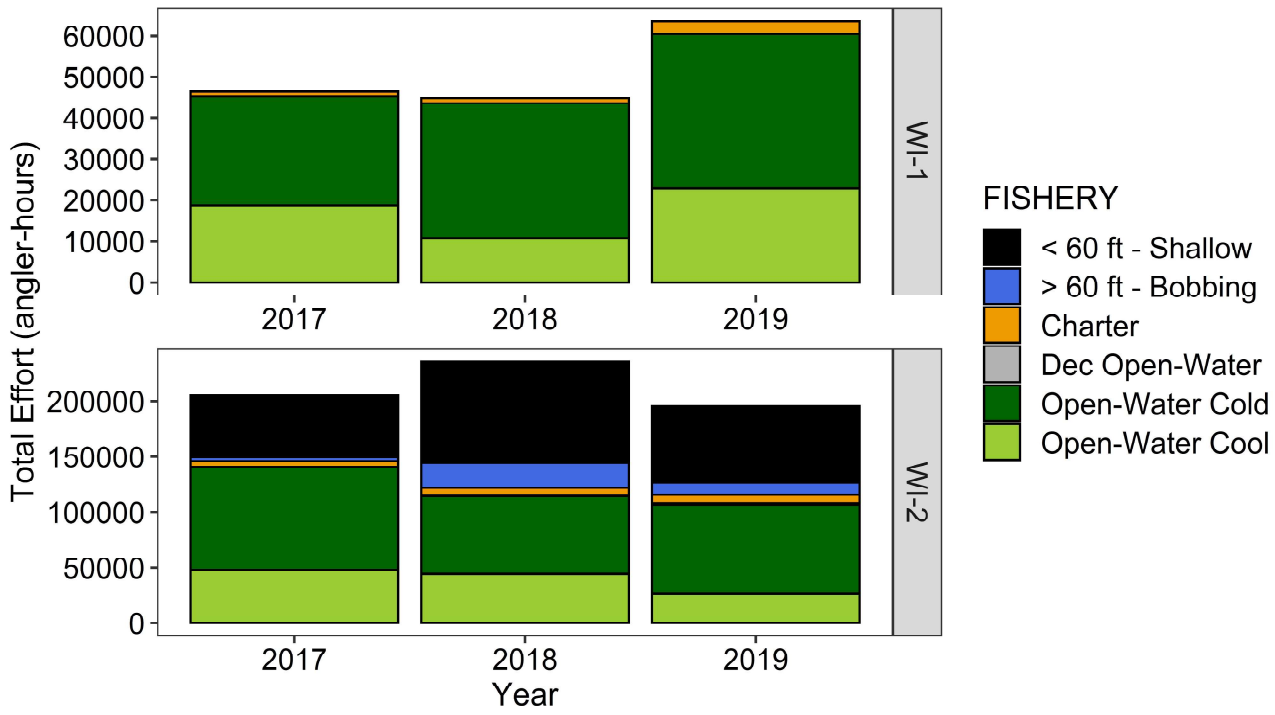

Figure 2. Total estimated fishing effort (angler-hours) by each fishery sampled in the WDNR Creel Survey within each management unit (WI-1 and WI-2) from 2017 to 2019.

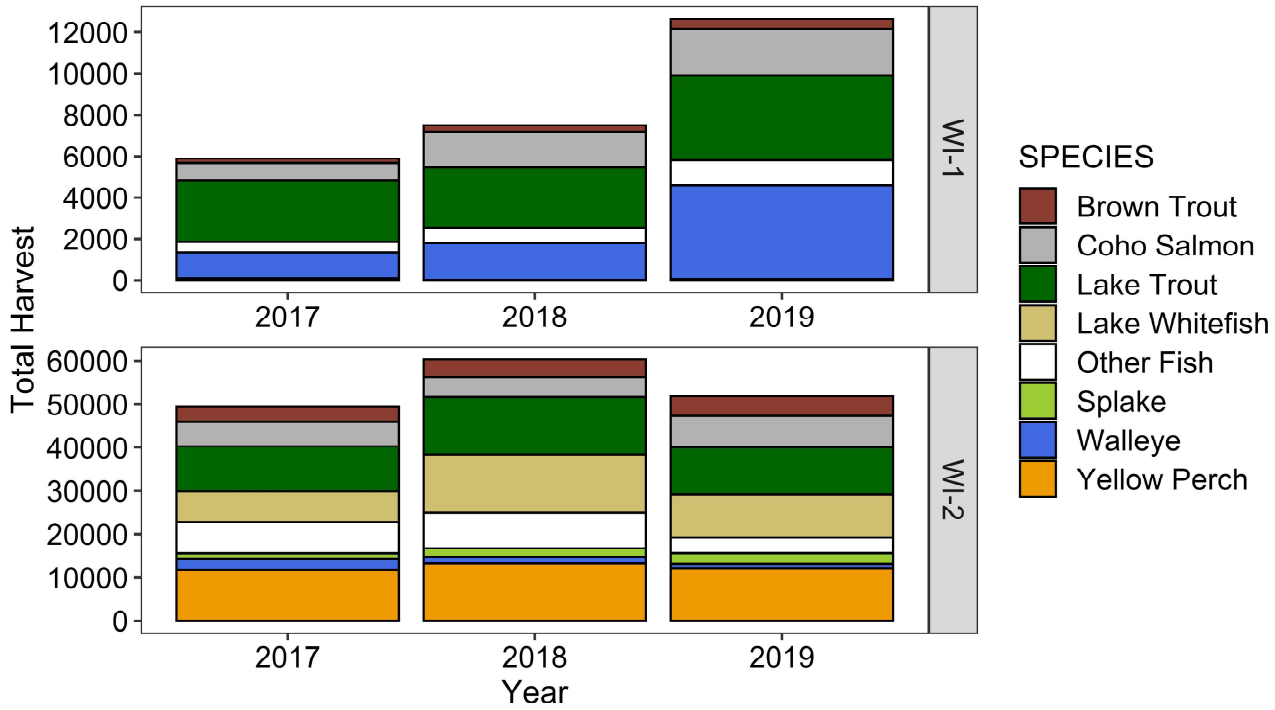

Figure 3. Total estimated harvest of the main seven species in the WDNR Creel Survey within each management unit (WI-1 and WI-2) from 2017 to 2019. All other species are represented into the "Other Fish" category.

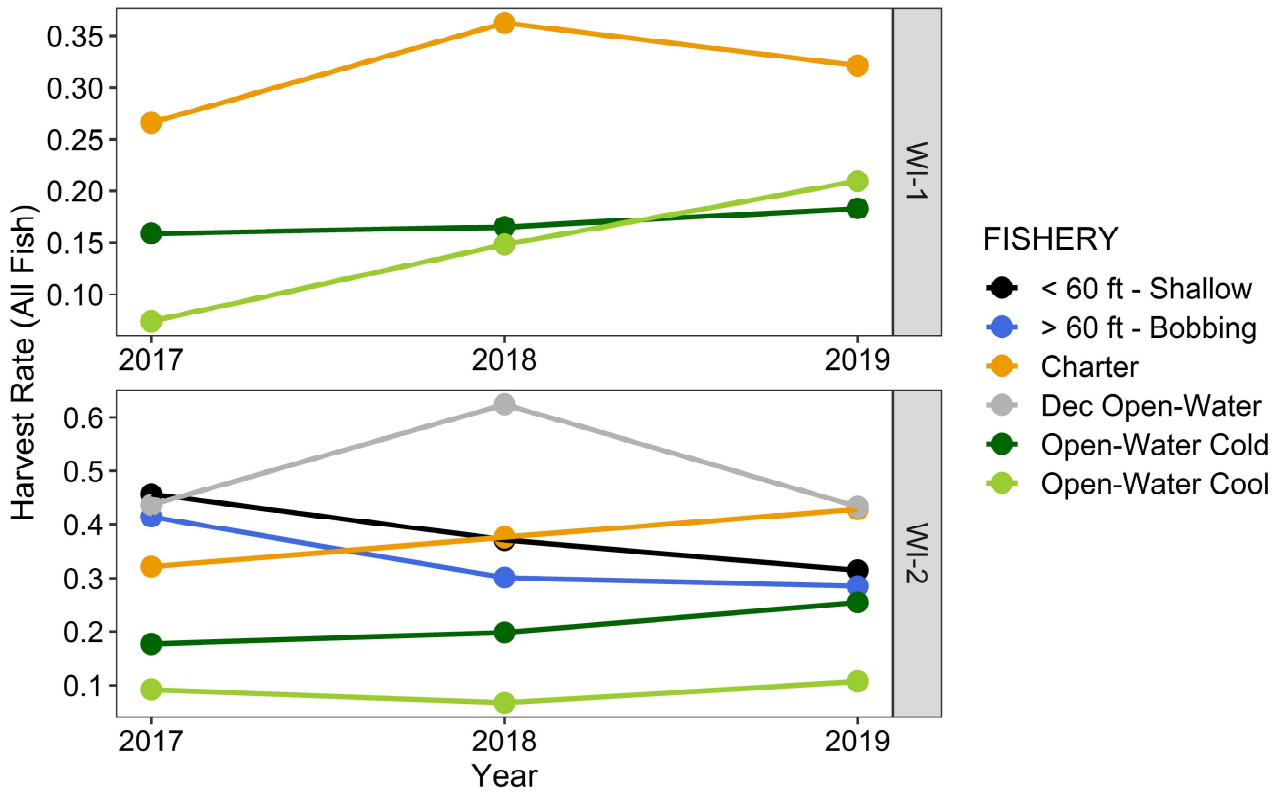

Figure 4. Estimated harvest rate (fish per angler-hour) of all fish within each fishery sampled in the WDNR Creel Survey within each management unit (WI-1 and WI-2) from 2017 to 2019.

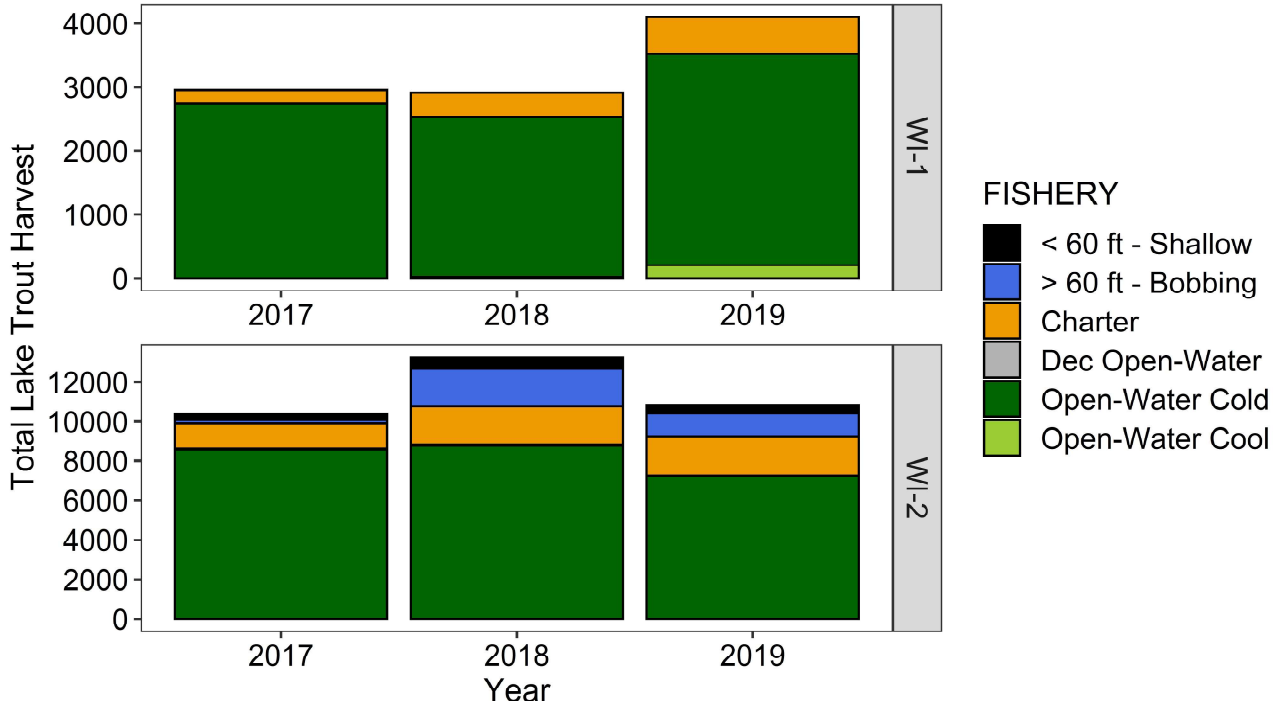

Figure 5. Total estimated harvest of Lake Trout by each fishery sampled in the WDNR Creel Survey within each management unit (WI-1 and WI-2) from 2017 to 2019.

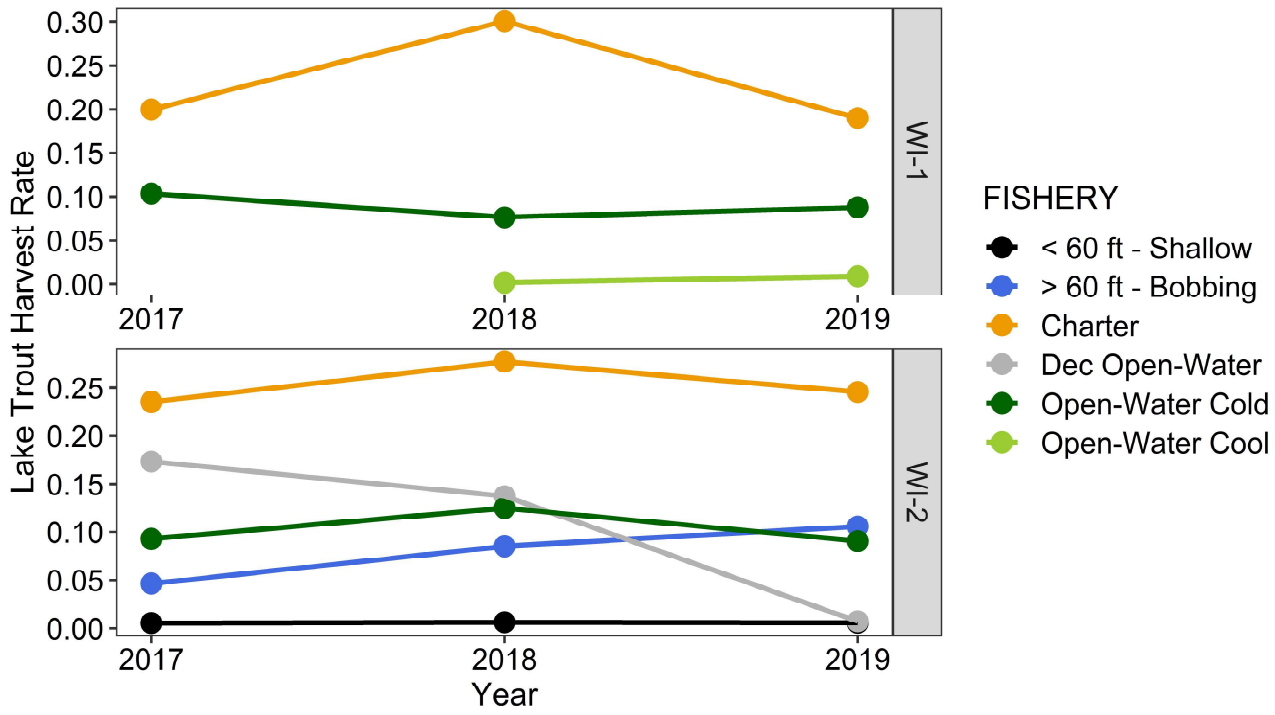

Figure 6. Estimated harvest rate (fish per angler-hour) of Lake Trout by each fishery sampled in the WDNR Creel Survey within each management unit (WI-1 and WI-2) from 2017 to 2019.

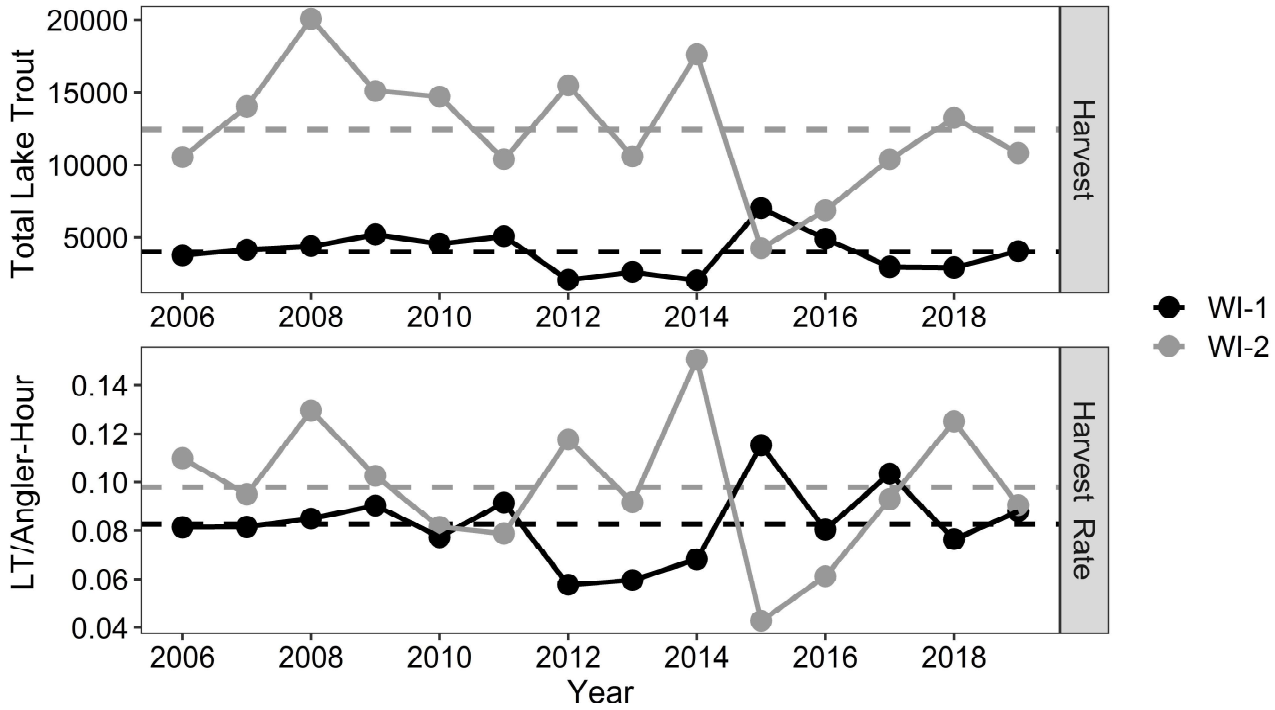

Figure 7. Estimated Lake Trout harvest (top) and harvest rate (fish per angler-hour) within each management unit (WI-1 and WI-2) from 2006 to 2019. Total harvest is from all fisheries sampled in the WDNR Creel Survey, and harvest rate is from the Open-Water Cold fishery. Dashed lines are average values from throughout the time series.